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Setifikaat

PATENTKANTOOR

DEPARTMENT VAN HANDERL
NYWERHEID

Certificate

PATENT OFFICE

DEPARTMENT OF TRADE
AND INDUSTRY

Hiermee word gesetifiseer dat
This is to certify that

PCT/ZA 2003/00094

The attached documents are true copies of the Form P2, P1, P6 and a Provisional Specification of a South African Patent application **No. 2002/05863**

In the name of : **JOHN EDGAR SCRAGG**

Filed on the : **23 JULY 2002**

Entitled : **FILTER**

Geteken te **PRETORIA** in die Republik van Suid-Afrika, hierdie **12th** dag van **OCTOBER 2006**
Signed at in the Republic of South Africa, this day of

.....
Registrateur van Patente
Registrar of Patents

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
APPLICATION FOR A PATENT AND ACKNOWLEDGMENT OF RECEIPT
(Section 30(1) Regulation 22)

FORM P.1

THE GRANT OF A PATENT IS HEREBY REQUESTED BY THE UNDERMENTIONED APPLICANT ON THE BASIS OF THE PRESENT APPLICATION FILED IN DUPLICATE

21	01	OFFICIAL APPLICATION NO	2002/5863

BB REF: 10298

71	FULL NAME(S) OF APPLICANT(S)

JOHN EDGAR SCRAGG

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54	TITLE OF INVENTION

FILTER

● ☐ THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2.
(COUNTRY) (DATE) (NO.)

☐ 21 01 THE APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO

☐ 21 01 THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO

THIS APPLICATION IS ACCOMPANIED BY:

- [x] 1. A single copy of a provisional ~~or two copies of a complete~~ specification of **11** pages
- [x] 2. Drawings of **3** sheets
- [ ] 3. Publication particulars and abstract (Form P.8 in duplicate).
- [ ] 4. A copy of Figure of the drawings (if any) for the abstract.
- [ ] 5. An assignment of invention
- [ ] 6. Certified priority document(s). (State number)
- ● [ ] 7. Translation of the priority document(s)
- [ ] 8. An assignment of priority rights
- [ ] 9. A copy of Form P.2 and the specification of RSA Patent Application No
- [x] 10. Form P.2 in duplicate
- [x] 11. A declaration and power of attorney on Form P.3
- [ ] 12. Request for ante-dating on Form P.4
- [ ] 13. Request for classification on Form P.9
- [ ] 14.

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DATED THIS **22nd** DAY OF **July 2002**

BRIAN BACON & ASSOCIATES
APPLICANTS PATENT ATTORNEYS
The duplicate will be returned to the applicant's address for service as proof of lodging but is not valid unless endorsed with official stamp

REGISTRAR OF PATENTS, DESIGNS, TRADE MARKS AND COPYRIGHT
RECEIVED
OFFICIAL DATE STAMP
2002 -07- 23
REGISTRAR OF PATENTS

FORM P.2
(To be lodged in duplicate)

REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978

REGISTER OF PATENTS

OFFICIAL APPLICATION NO.	LODGING DATE: PROVISIONAL	ACCEPTANCE DATE
22 01 2002/5863	22 2002-07-23	
INTERNATIONAL CLASSIFICATION	LODGING DATE: COMPLETE	GRANT DATE
51	23	47

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APPLICANTS SUBSTITUTED	DATE REGISTERED
71	

ASSIGNEE(S)	DATE REGISTERED
71	

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PRIORITY CLAIMED	COUNTRY	NUMBER	DATE
	33 —	31 —	32 —

TITLE OF INVENTION

54 FILTER

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PATENT OF ADDITION TO NO.	DATE OF ANY CHANGE
61	
FRESH APPLICATION BASED ON	DATE OF ANY CHANGE

BB Ref No: **10298**

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CAPE TOWN

FORM P.6

REPUBLIC OF SOUTH AFRICA
Patents Act, 1978

PROVISIONAL SPECIFICATION

(Section 30 (1) – Regulation 27)

21	01	OFFICIAL APPLICATION NO

2002/5863

22	LODGING DATE

2002-07-23

71	FULL NAME(S) OF APPLICANT(S)

JOHN EDGAR SCRAGG

72	FULL NAME(S) OF INVENTOR(S)

JOHN EDGAR SCRAGG

54	TITLE OF INVENTION

FILTER

FIELD OF THE INVENTION

THIS INVENTION relates to filters.

BACKGROUND TO THE INVENTION

Filters are used in the fuel lines of diesel and petrol engines. Such filters are intended to remove contaminants such as water and solid particles. Current technology is resulting in high volume fuel flow rates, particularly in diesel engines with the consequence that filters in use at this time are, at least in circumstances where an exceptional level of contamination occurs, unable to prevent the contaminant passing through the filter. This can cause engine damage.

The high level of fuel flow rate in a diesel engine is because the fuel is used to cool the fuel injectors. Thus most of the fuel pumped is returned to the tank and only a relatively small percentage of that pumped is consumed in the engine.

The present invention seeks to provide an improved filter for removing contaminants, both solid and liquid, from a flowing fluid product. The fluid product will normally be fuel flowing to an engine but can be another liquid product or a gas which must be delivered free of solid and liquid contaminant.

BRIEF DESCRIPTION OF THE INVENTION

According to one aspect of the present invention there is provided a filter comprising a housing having an inlet and an outlet, a filter cartridge in the housing, means for mounting the cartridge in the housing, and means for rotating the cartridge.

Said means can be blades over which flowing liquid passes and which apply a torque to the cartridge. Alternatively the means can be a nozzle or a series of tangentially arranged nozzles from which the fuel flows, the reaction force as the fuel leaves the nozzle(s) causing the cartridge to rotate.

According to a further aspect of the present invention there is provided a filter comprising a housing having an inlet and an outlet, a filter cartridge having a core, a float in the core, said float having a buoyancy such that it sinks in the liquid product to be filtered and floats in a liquid which contaminates said liquid product, and a seal against which the float presses when it floats upwards with an increasing level of contaminant liquid in the housing, contact between said float and seal isolating said inlet from the outlet and terminating flow through the filter.

According to another aspect of the invention there is provided a filter comprising a housing having an inlet and an outlet, a filter cartridge in the housing, the cartridge having a hollow core, means for mounting the cartridge in the housing, means for rotating the cartridge, a float in the core, said float having a buoyancy such that it sinks in the liquid product to be filtered and floats in a liquid

which contaminates said liquid product, and a seal against which the float presses when it floats upwards with an increasing level of liquid contaminant in the housing, contact between said float and seal isolating said inlet from the outlet and terminating flow through the filter.

Said seal preferably seals off the outlet from the interior of the housing.

According to yet another aspect of the present invention there is provided a filter cartridge comprising a hollow core, filter material surrounding the core and a float which can move vertically in the core.

According to a still further aspect of the present invention there is provided a filter cartridge comprising a core, a plurality of curved vanes extending outwardly from the core, each vane having a convex leading surface and a concave trailing surface and filter material packed into the depressions defined by said trailing surfaces.

The cartridge defined in the preceding paragraph can include means which, when subjected to fuel flowing through the cartridge, produces a reaction force for rotating the cartridge. It may also include a float in the hollow core.

According to yet another aspect of the present invention there is provided a filter comprising a housing having a main inlet and a main outlet, a filter

cartridge in the housing, a first float which sinks in the product flowing through the housing but floats in water, a first seat, said first float lifting into contact with said first seat and closing said main outlet as water accumulates in the housing, a drain outlet at the lower end of the housing, a valve closure element in a chamber, a second seat, spring means for pressing said element into contact with said second seat thereby to close the drain outlet, a connection between said chamber and the main outlet on the side of the first seat remote from said float whereby suction is applied to said chamber, and a second float which sinks in the product flowing through the housing but floats in water, said second float, when in its sunken position, closing off said drain outlet.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:-

Figure 1 is a diametral section through a filter;

Figure 2 is a horizontal section through the filter of Figure 1;

Figure 3 is a section through a further filter;

Figure 4 is a section through a still further filter.

DETAILED DESCRIPTION OF THE DRAWINGS

The filter 10 illustrated in Figures 1 and 2 comprises a cylindrical

housing 12 having an inlet 14 for contaminated liquid product and an outlet 16 for filtered liquid product. Within the housing 10 there is a filter cartridge 18.

The cartridge includes a tubular core 20, the core having a plurality of holes 22 in the walling thereof. Filtered product enters the core 20 through these holes 22. A plurality of curved vanes 24 (see Figure 2) extend outwardly from the core 20.

Each vane 24 has a convex leading face 26 and a concave trailing face 28. The concave faces 28 define depressions into which filter material 32 is packed. The filter material used currently in fuel filters is a paper which is folded to provide a series of layers, and this type of filter material can be packed into the depressions.

The core 20 is extended in each direction by spigots 34, 36. These spigots run in bearings 38, 40 carried by the housing 12. The spigot 36 carries a plurality of blades 42 over which the filtered product flowing from the core 20 to the outlet 16 flows. The blades 42 are so orientated that the flowing product produces a reaction force which rotates the cartridge 18 in the bearings 38, 40.

The blades 42 can be replaced by a nozzle which is directed tangentially with respect to the axis of rotation of the cartridge. Fuel flowing from the nozzle causes a reaction force which rotates the cartridge. Two or more nozzles

can be used.

The blades 42 or nozzle(s) can be carried by the cartridge. Alternatively they can be carried by a rotatable part of the housing and there can be means for rendering the cartridge fast with the rotatable part of the housing.

In use contaminated product enters the housing 12 via the inlet 14 and flows into the cartridge 18. After passing through the filter medium the filtered product flows into the core 20, through the spigot 36 and thus reaches the outlet 16. The product flowing over the blades 42 causes the cartridge 18 to rotate in the bearings 38, 40.

The concave front surfaces of the vanes 24 throw solid contaminants outwardly towards the housing's cylindrical wall thus keeping them from the filter material 32 behind the vanes.

The vanes 24 can be inclined so that, in the direction of rotation, the upper part of the vane leads the lower part. This imparts a downward component to the force applied to the solid particles thus assisting in accumulating them in the lower part of the housing.

Turning now to Figure 3, the cartridge 44 illustrated is within a housing 46 having a contaminated product inlet 48 and a filtered product outlet 50. The

cartridge 44 has a perforated core 54 with a float 56 in the core. The float 56 has a buoyancy such that it sinks in the liquid to be filtered but floats in the liquid contaminant. Normally the liquid to be filtered is diesel or petrol (gasoline) and the contaminant water and solid particles.

The outlet 50 is encircled by a seal 52. As the level of the water removed from the contaminated product rises, the float 56 floats upwardly in the core 54. Eventually the float 56 is pressed against the seal 52 thus preventing water retained in the housing 46 from leaving the housing via the outlet 50 and reaching the engine.

The rotary filter cartridge of Figures 1 and 2 can be provided with a float as described in Figure 3.

Referring now to Figure 4, this shows a further form of filter. Where applicable like-parts have been designated with the same reference numerals as used in Figure 3 with the addition of the suffix .1.

The lower end of the core 54.1 is open and there is, below the open lower end of the core, a disc 58 which is held in place by a holder 60.

At the lower end of the housing 46.1 there is a drainage outlet comprising a valve seat 62, a valve closure element 64, and a coil spring 66 which

normally presses the element 64 against the seat 62.

The spring 66 and element 64 are in a chamber 68 which is connected by a pipe 70 to the outlet 50.1. Thus suction at the outlet 50.1 is applied to the chamber 68 thereby to suck the element 64 away from the seat 62. In a further form the element can be part of the wall of the chamber 68.

A cage 72 is provided above the seat 62, there being a float 74 in the cage 72.

A vacuum release button 76 is provided for connecting the inlet 50.1 to atmosphere and allowing air to flow in.

The fuel entering through the inlet 48.1 is usually contaminated with water. The fuel passes through the filter cartridge 44.1 and exits through the outlet 50.1. The removed water accumulates in the bottom of the housing 46.1 and initially causes the float 74 to lift away from the valve seat 62. However, because there is little in the way of vacuum applied to the chamber 68, the spring 66 is able to hold the element 64 against the seat 62 and thus the water drainage outlet remains closed.

As the water level rises, the float 56.1 moves upwardly into contact with the seal 52.1 and flow of fuel through the filter to the engine ceases.

It will be understood that fuel being sucked through the filter pulls the disc 58 against the lower end of the cartridge 44.1 and closes off the lower end of the core 54.1.

Once flow through the filter is interrupted by the float 56.1, the suction effect in the outlet 50.1 is greatly increased and this is applied through the pipe 70 to the chamber 68. The suction effect is such that the force exerted on the element 64 overcomes the force of the spring 66 and the drainage opening at the lower end of the housing 46.1 thus opens. The water level in the housing commences to drop as drainage takes place through the drainage outlet.

As soon as flow through the filter ceased, the element 58 dropped away from the lower end of the core 54.1. Hence water is able to flow from the core 54.1 around the element 58 and out through the drainage outlet.

As the water level approaches the lower end of the housing 46.1, the sinking float 74 seals-off the drainage outlet before fuel can emerge. The element 64, however, remains spaced from the seat 62 in view of the fact that the float 56.1 is still sucked against the seal 52.1, and the vacuum condition has not been broken.

When the vacuum release button 76 is pressed, air flows into the outlet 50.1. The float 56.1 is thus no longer sucked against the seal 52.1 and it drops back to the bottom of the core 54.1. Simultaneously the sub-atmospheric pressure in the

chamber 68 increases and the spring 66 is able to overcome the vacuum derived force. The element 64 thus re-seats and the drainage outlet is closed.

In a modified form the reset button 76 is omitted and the float 56.1 has a bore through it from top to bottom. When the float 56.1 lifts into engagement with the seat 52.1, the engine draws a vacuum in the outlet 50.1 before fuel starvation shuts it down. Depending on the size of the bore in the float, fuel flows at a predetermined rate through the float and the vacuum condition is relieved. By adjusting the size of the bore, the time for which the drainage outlet is held open can be adjusted. A filter of this type is fully automatic and does not require driver intervention to restart flow of fuel.

Dated this 22nd day of July 2002

Brian Bacon & Associates
Applicant's Patent Attorney

John Edgar Scragg

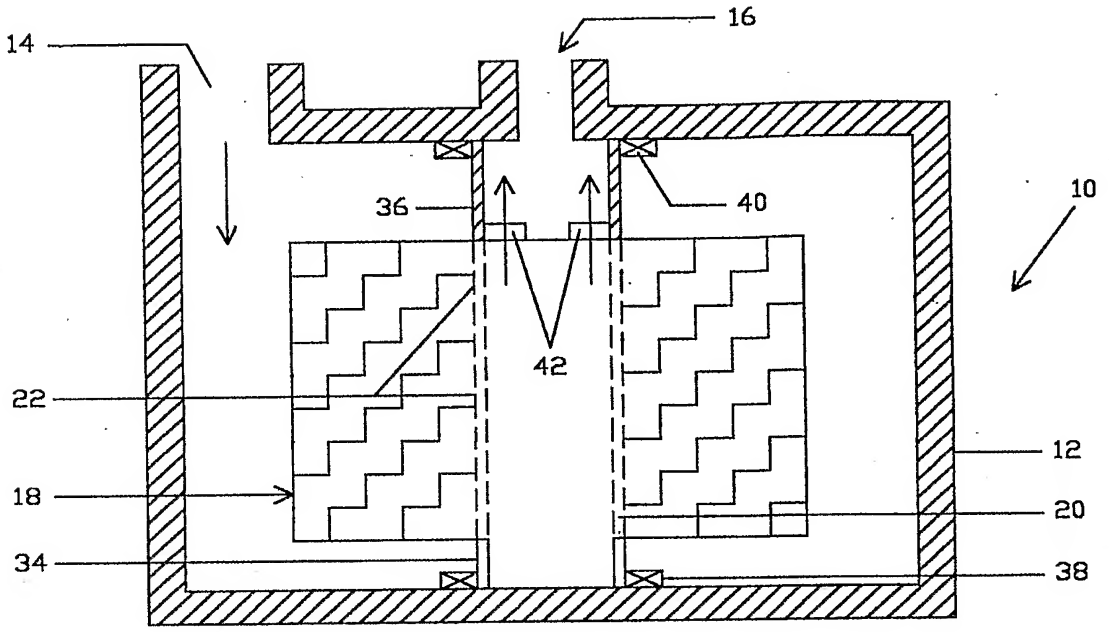

FIG. 1

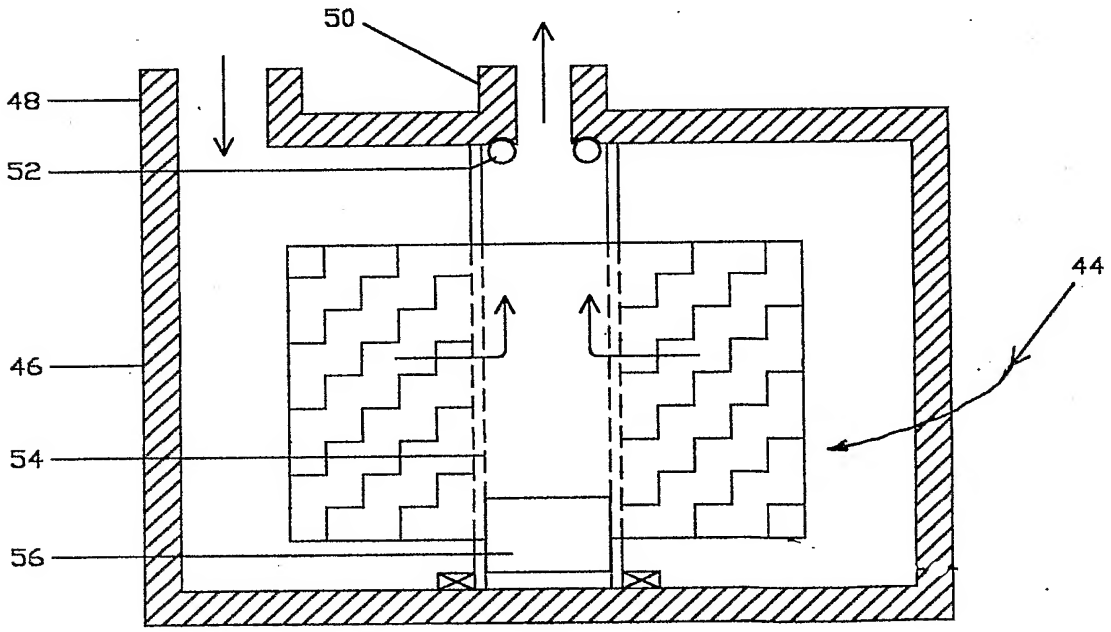

FIG. 3

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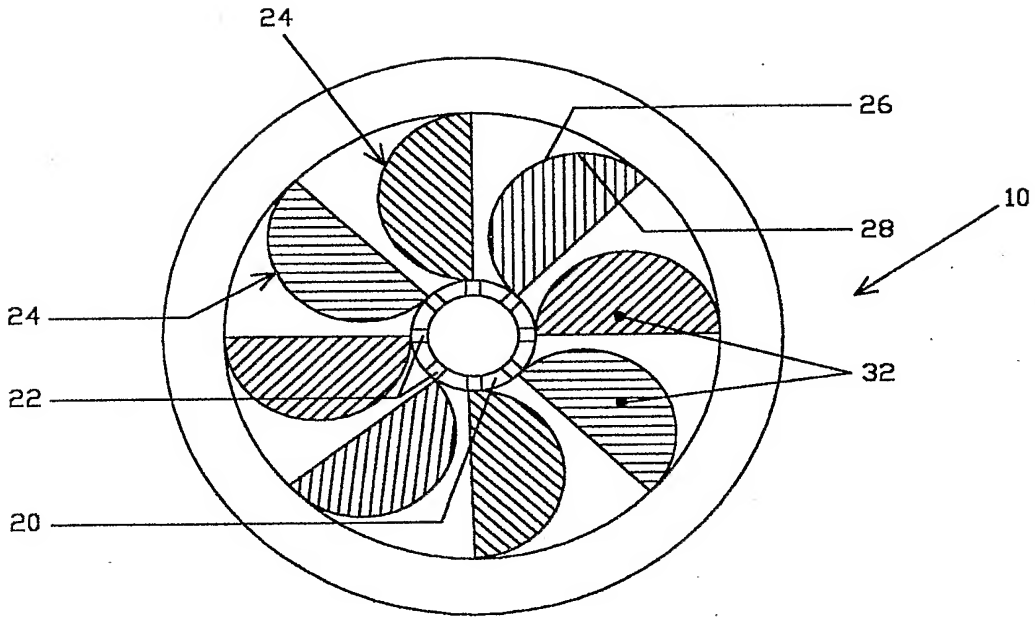

FIG. 2

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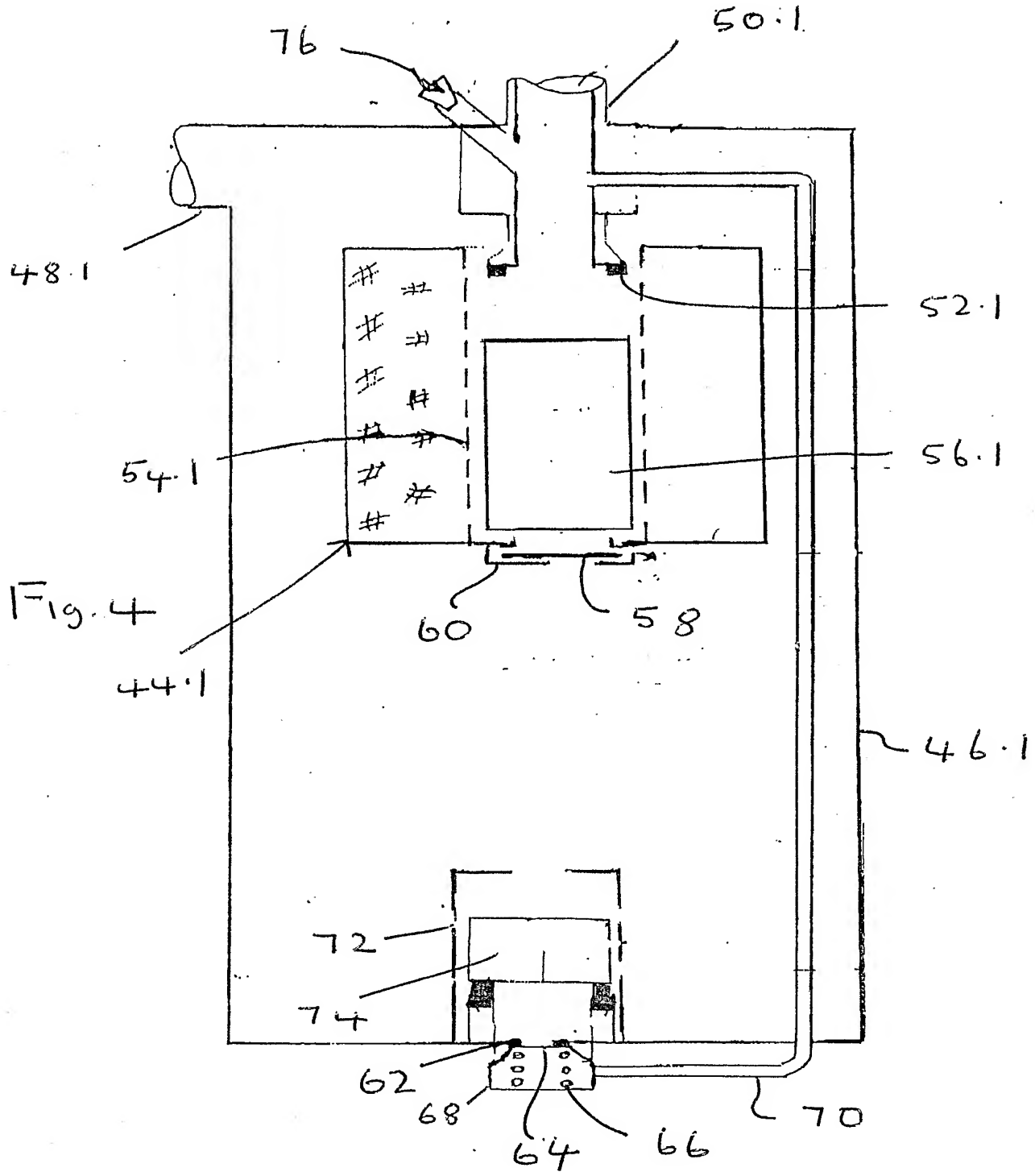

Fig. 4

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